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(54) Title: METHOD AND SYSTEM FOR REPORTING VOICE MESSAGES TO THEIR RECEIVERS IN A MULTI-SERVICE NETWORK		
(57) Abstract		
The invention relates to a method and a system for communicating audio messages to message receivers in an integrated services network which is provided with a message switching service and to which an audio message server is connected, and in which method the necessary information from an arrived audio message is automatically stored by means of the audio message server (C) to be further transmitted as a message by the message switching service of the network to the terminal equipment (B) of the receiver of the audio message as an indication of an audio message to be unloaded.		

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Method and system for reporting voice messages to their receivers in a multi-service network.

5 The present invention relates to a method and a system for communicating audio messages to their receivers in an integrated services network.

10 The telephone and data networks that are currently realized and being designed are digital integrated services networks normally supporting both 10 audio communication and digital signalling. By integrated services networks are understood in this context networks wherein access to both sound and signalling channels can be established with the same basic terminal equipment, and wherein the different 15 services realized in them are capable of dividing between themselves the signalling and communication channels suitable for each purpose.

20 The most recent land mobile networks, such as the network known as the GSM network being designed 20 for Europe, operating in the range 900 MHz, and the CMS88 mobile phone system being designed for the United States, are in their communication mode digital TDMA networks, which means, besides high quality speech signal transmission, also possibilities for 25 transfer and intermediate storage of data on data channels of different types and speeds. In addition to the subscriber traffic, the mobile phone system itself needs efficient data transmission services for ever diversifying forms of service and the signalling 30 therein. Thus for instance short message service (SMS) is intended to be included in these networks, the short message service center (SC) appertaining to this service being capable of receiving and transmitting from a mobile phone short messages in digital 35 form according to the so-called "store-and-forward"

principle further to another mobile phone. Signalling
is possible simultaneously with another service,
since the short messages are transmitted as in an
integrated services network, for instance over the
5 signalling channel of the GSM, not over the voice
channel.

A corresponding message switching service is
also possible in a digital ISDN telephone network,
which has both voice channels and signalling chan-
10 nels.

The purpose of message switching in a network
is for instance to improve the accessibility of tele-
phone subscribers. However, for instance the specifi-
cations for short message transmission in the GSM,
15 such as GSM 03.40, do not take a stand on the real-
ization of the interface between the mobile services
switching centers (MSC) and the short message service
center (SC), the structure of the SC, or the dif-
ferent forms of the short message service applica-
20 tions based on the SMS service of the network.

The present invention is concerned with the
application of the message switching service of an
integrated services network to audio communication
between a caller and a receiver of a call, in such a
25 way that the accessibility of the users is improved
and that normal calls between the users of the ser-
vice can at least partly be replaced with the new
function according to the invention.

To achieve this effect, the method and system
30 of the invention are characterized in that which is
set forth in the ensuing claims.

The purpose of the method of the invention is
to facilitate communication between the terminal
equipment users of the network for instance in a
35 situation where the receiver of the call is not

reached.

The system realized in accordance with the invention affords to the maker of the call a possibility of leaving an audio message, whereof the receiver of the call is informed and which he can listen to later. Thus the audio message service accomplished in accordance with the invention significantly improves the accessibility of a subscriber connected to said network, since a message can always be left, in confidence that it will not remain unnoticed by the receiver. The exchanges of the telephone network, the audio message server, and the actual terminal equipment, such as a mobile phone, participate in the realization of the service.

Depending on the desired degree of automation and facilities of the service, these are new equipment specifically designed for the purpose or known equipment that has been supplemented.

With the present technology, it is impossible to give to the receiver of an audio message an indication of the arrival of the audio message, since such a message cannot be transmitted to the telephone set of the receiver. It is known to inform of an audio message left for instance via a telephone network for instance through a remote paging network to a remote paging device. This service will not work in the integrated services network to which the invention refers, wherein capability of communication typically on at least the sound and signalling channels of the network is required of the network terminal. This is necessary for accomplishing efficient supplementary services and a sufficient degree of automation thereof.

The service also replaces a telephone answering machine connected to a terminal, which is a sig-

nificant improvement for instance in the outfit of a mobile phone, since the realization of a telephone answering machine in the actual portable mobile phone is technically difficult and expensive. Within the 5 scope of the method of the invention, it is possible to combine a call request by a maker of an audio message and an automatic answer-back call to him. This is a significant improvement for the answer-back call and in view of facilitating the use; into the 10 present telephone answering machines/audio message systems, the caller can only dictate his own telephone number for contact.

The invention will be explained in more detail in the following by means of examples with reference 15 to the accompanying drawings, wherein

Figure 1 shows the storage and notifying step of an audio message service realized in accordance with one embodiment of the method of the invention;

Figure 2 shows the release step in an audio 20 message service realized in accordance with the embodiment of Figure 1;

Figure 3 shows the different steps of an audio message service realized in accordance with another embodiment of the method of the invention.

25 Figure 1 presents by way of example in the case of a digital land mobile network how a person X, with his telephone A which may be any terminal equipment connected to any network having contact with said integrated services network, for instance a conventional telephone, attempts to contact person Y using a mobile phone B in a PLMN integrated services network.

When person X makes a call to the B telephone 35 number of person Y, he finds in this case that the connection (arrow 1) is unsuccessful: the number does

not answer, phone B is busy, or phone B cannot be reached by the PLMN radio network.

The mobile services switching center D detects the fact that the call is not switched and routes the 5 call automatically (arrow 2) to another number in the telephone network, which is the address of an audio message server C. This routing forward can be a feature to be separately attached to phone B, and the automatic hand-off can also be replaced with a separate call from telephone A to the audio message server without departing from the invention.

10 The audio message server C operates as follows:

15 - it instructs person X, for instance by means of a stored audio prompt, to leave an audio message and receives and stores this for instance in digital form;

20 - it instructs him to dial his own telephone number and stores it in its memory, or stores the number automatically;

25 - it stores the number of mobile phone B, that is, the address for which the call was intended;

30 - it produces for the generated audio message an identification, that is, an internal search address in the audio message server.

35 If no identification is produced, the system operates further in accordance with the invention by unloading all audio messages that have arrived, when unloading is requested of the audio message server. Thereafter, the audio message server C transmits (arrows 3, 4) an indication of an arrived audio message to the mobile phone B to which the call was directed utilizing the short message service (SMS) center E of the PLMN integrated services network. This normally takes place immediately on the signalling channels of the network independently of the possible

other use of the phone B, and thus the message can be retrieved by the user for listening as soon as he responds to the text, light, sound, or corresponding signalling of a short message from the phone, indicating 5 an arrived audio message. If the mobile phone B has been unconnected to the PLMN network, an indication of the audio message is sent as soon as the connection set-up is successful.

The information necessary for making a contact, 10 such as the name and address information of the user of the calling equipment, can also be stored as a message by means of the audio message server in such a way that a plain-language message is produced from the information contained in the message for the 15 audio message receiver. Thus for instance a short message to be sent to mobile phone B can contain a message from the audio message server, having the form "There is an audio message for you from telephone number AA in audio message server CC under 20 identification TT" in text form or as a plain-language audio message. The conversion of the message to an audio message is performed for instance in a message switching center with a speech synthesizer, in which situation the signalling channels are used to 25 open a speech channel for transmitting a plain-language message to the receiver B. Thus the service description includes the address (telephone number) CC of the audio message server, the identification TT necessary for the release of the audio message from 30 the server C, and the address (telephone number) AA of the caller.

Figure 1 also shows the main components of the system of the invention, that is, an audio message server C connected to an integrated services network exchange D, storing audio messages from the contact- 35

ing person X, and being adapted to store automatically the necessary information from each audio message and to construct the information into a network message, and a message switching center E of the network, being adapted to transmit the messages to the receiver Y of audio messages as an indication of audio messages awaiting release.

Figure 2 shows a situation after Figure 1, when the user Y of mobile phone B connected to the audio message service attempts to unload an audio message left to him by a person X by telephone A. The user Y can give to the mobile phone B a short command, constituted for instance by a single keying, whereafter the mobile phone B automatically sets up a call (arrow 5) to the audio message server C, gives a playback command on the basis of the audio message identification TT to the audio message server, which repeats the audio message to the user Y through a telephone (arrow 6). The address of the audio message server contained in the received message can also be used for automatic contact with the audio message server for the unloading of the audio message.

After the user has heard the message he can, if he so desires, call the person X who left him the audio message by again giving a short command, such as pressing of a key, to the mobile phone, whereupon the mobile phone automatically sets up a call (arrow 7) on the basis of information AA provided in the service description to telephone A of person X or to another number given by him. The address of the terminal device requesting contact, which is contained in the received message, can also be used for automatic connection with said terminal device after the unloading of the audio message.

The automatic or press-key unloading of the

audio message and/or the answer-back call to the messenger are not necessary for the realization of the method of the invention, the inventive concept of which is thus based on making use of a separate audio message server in connection with an integrated services network, and on communicating messages by means of a message switching service that is also otherwise realized in the network. However, said properties are fully practicable improvements to the basic solution defined in the main claim and essential for the ease of use.

In some situations, the implementation of all of the features is not possible for instance on account of outdated or partly incompatible equipment. If for example the exchange D of the network is not capable of re-routing failed calls, the person X who desires to make a contact must make a direct call to the audio message server C realized in accordance with the invention. If the audio message server C is not capable of acquiring the telephone number of A, an automatic answer-back call is impossible, or requires the caller to dial the necessary telephone number manually, the service being otherwise operative. If again the terminal of the network does not support the audio message service as such, the user still receives a service description in text form as a message, generated by the audio message server, on the basis of which he is able to call X back manually. Thus the use of the service does not necessarily require the dictation of an audio message into the audio message server, but the dictation step can be by-passed and only the contact information stored using the keys of the telephone. The message is however handled and delivered normally like an audio message, the sound section of which is blank. In such

a case, an automatic answer-back call can actually be realized in a remote paging service. The fact that this is effected via the audio message server has no bearing on the matter.

5 Figure 3 shows an embodiment of the invention wherein only certain features have been realized in accordance with the foregoing. In this case, the telephone subscriber X must himself call (arrow 8) the audio message server C with a DTMF telephone A after his call attempt 1 has failed. In that situation, the server C instructs the caller to dial the telephone number of the mobile phone B of the receiver Y of the message for instance by means of a recorded audio prompt. After this has been performed,
10 the server C checks that said called subscriber B is a subscriber to the audio message service. Thereafter the server inquires whether the caller Y wishes to leave a message. The caller responds to the questions by means of keys, and if he so wishes, leaves a message by dictating it into the audio message server C, which produces an identification for the message.
15 After this, the server instructs the caller to dial his own telephone number, if he wishes to deliver a call request. Lastly, the connection is set down.
20 Hereafter the unloading of the message and the other functions operate as explained in connection with Figures 1 and 2.

25 It is evident to one skilled in the art that the different embodiments of the invention are not restricted to the examples presented above, but they can vary within the scope of the ensuing claims. Thus the integrated services network can be constituted for instance by an ISDN network supplemented with a message switching service.

Claims:

1. A method for communicating audio messages to their receivers in an integrated services network provided with a message switching service and to which an audio message server is connected, and in which method the necessary information of an arrived audio message is automatically stored by means of the audio message server (C) to be further transmitted as a message by the message switching service of the network to the terminal equipment (B) of the receiver of the audio message as an indication of an audio message to be unloaded.
2. A method as claimed in claim 1, wherein at least the address of the audio message server (C) and the address of the equipment (A) that has attempted contact are included in the message produced by the audio message server.
3. A method as claimed in claim 1 or 2, wherein the terminal equipment (B) connected to the audio message service uses the address of the audio message server contained in the message received from the audio message server for setting up an automatic connection with the audio message server (C) for unloading the audio message to the receiver (Y) of the audio message.
4. A method as claimed in claim 1, 2 or 3, wherein the exchange (D) of the integrated services network sets up a connection with the audio message server (C) automatically when a contact attempt to the terminal equipment (B) fails or at specific request for leaving an audio message.
5. A method as claimed in any one of claims 1 to 4, wherein the information necessary for a connection, such as the name and address information of

the user (X) of the calling equipment (A), is stored as a message by means of the audio message server (C) to be further transmitted by the message switching service of the network, and wherein a plain-language
5 message is produced from the information to the receiver (Y) of the audio message.

6. A method as claimed in any one of claims 1 to 5, wherein the audio message server (C) sends to target terminal equipment (B) of a contact attempt an
10 indication of the arrived communication in message form through the message switching center (E) of the integrated services network (PLMN) substantially immediately, or if the terminal equipment has been in an unconnected state in relation to the network,
15 immediately when the connection set-up is successful.

7. A method as claimed in any one of claims 1 to 6, wherein the address of the equipment (A) requesting contact, which is contained in a received message, is used for automatic connection with said
20 terminal equipment.

8. A method as claimed in any one of claims 1 to 7, wherein the integrated services network comprises a digital land mobile network in which audio messages arrived for a subscriber in the land mobile
25 network are communicated to the mobile phone (B) of the subscriber through the short message service constituting part of the land mobile network.

9. A method as claimed in any one of claims 1 to 7, wherein the integrated services network is constituted by an ISDN network supplemented with a message switching service.
30

10. A system for communicating audio messages to message receivers in an integrated services network, which system comprises a message switching center (E) and an audio message server (C), and in which
35

system the audio message server (C) storing audio messages is adapted to store automatically the necessary information from each audio message and to construct the information into a network message, and in
5 which the message switching center (E) is adapted to transmit the messages to the terminal equipment (B) of each audio message receiver as an indication of an audio message to be unloaded.

11. A system as claimed in claim 10, wherein
10 the audio message server (C) is adapted to include in the message at least the address of the audio message server (C) and the address of the equipment (A) that has attempted contact.

12. A system as claimed in claim 10 or 11,
15 wherein the exchange (D) of the integrated services network can establish a connection with the audio message server (C) automatically when a contact attempt to terminal equipment (B) fails or at specific request for leaving an audio message.

13. A system as claimed in any one of claims 10
20 to 12, wherein the audio message server (C) produces a message of the information necessary for a connection, such as the name and address information of the user of the calling equipment (A), to be further transmitted by the message switching center (E) of
25 the network, a plain-language message being produced from said information for the receiver (Y) of the audio message.

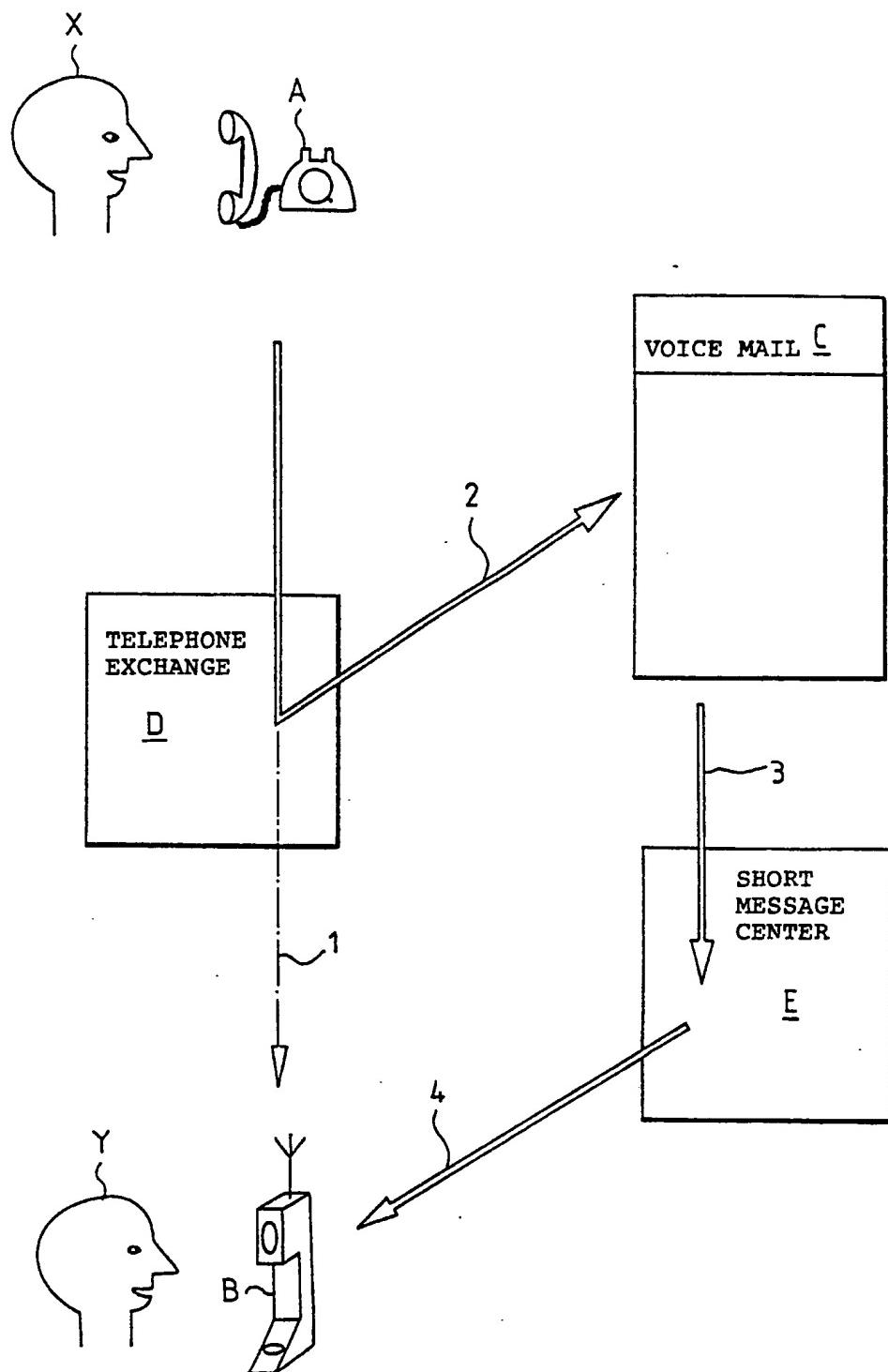


FIG. 1

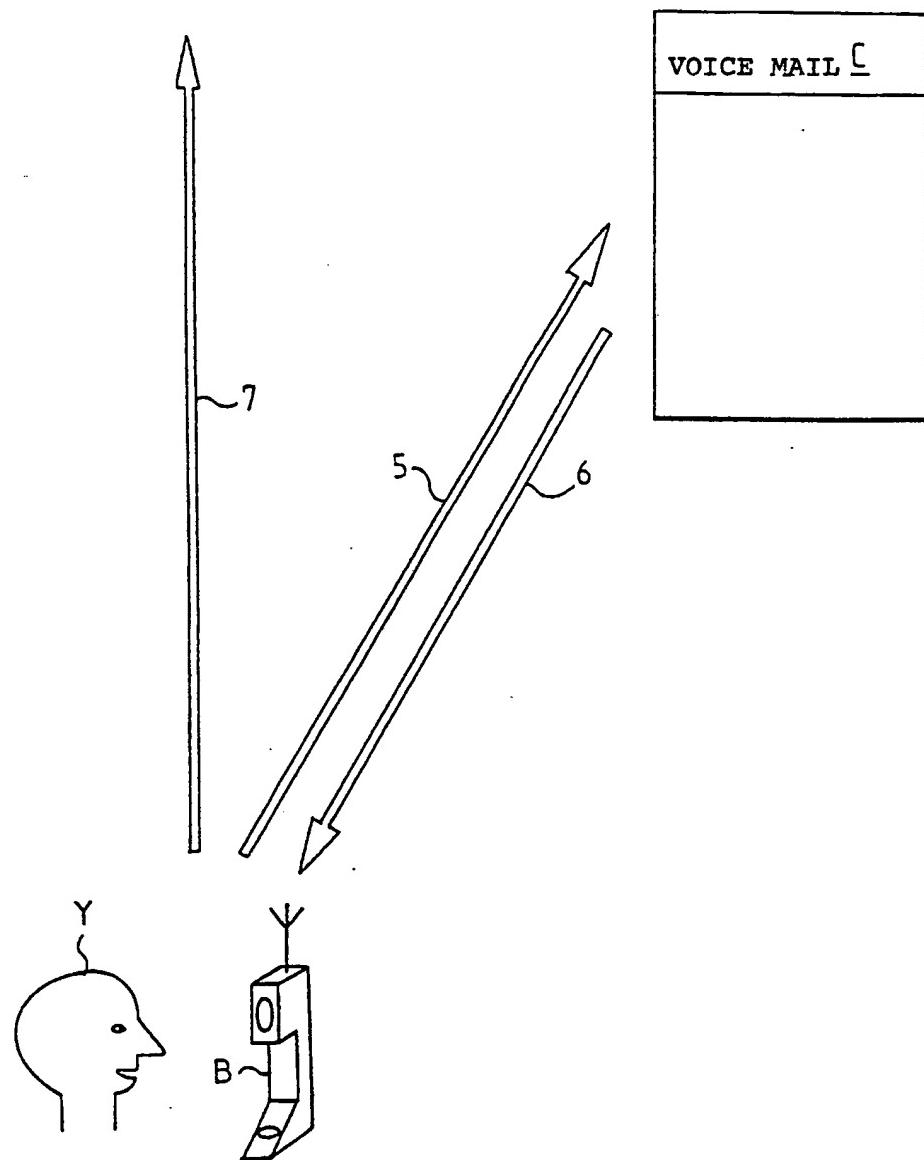
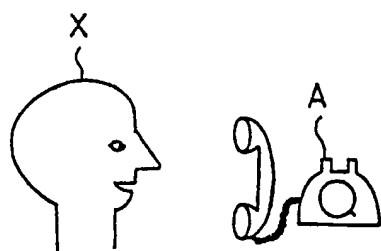


FIG. 2

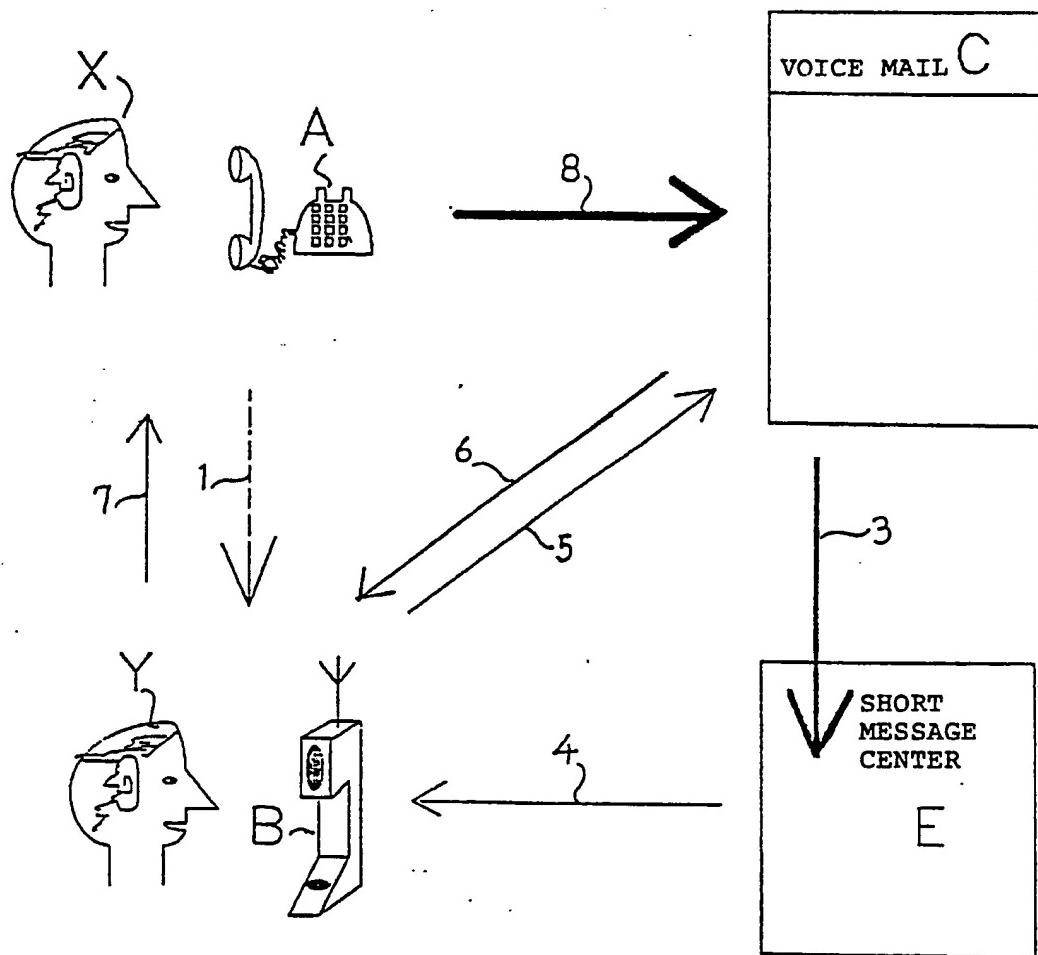


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI 92/00036

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: H 04 M 3/50		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	H 04 M	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	ERICSSON REVIEW , Vol. 3, 1987 Edward Beddoes et al: "Cellular Radio Telephony - the Racal-VODAFONE Network in Great Britain p. 130-140", see page 135 "Voice messenger" --- US, A, 4785473 (RANDALL R PFEIFFER ET AL) 15 November 1988, see the whole document --- -----	1,10
X		1,10
<small>* Special categories of cited documents:¹⁰</small> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed <small>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family</small>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
5th May 1992	1992 -05- 18	
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SWEDISH PATENT OFFICE	JAN SILFVERLING 	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/FI 92/00036**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on **28/03/92**.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4785473	88-11-15	NONE	